UNITED STATES PATENT AND TRADEMARK OFFICE

A

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,716	06/25/2003	Chandra Mouli	M4065.0904/P904	9955

24998 7590 01/03/2006

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street, NW
Washington, DC 20037

EXAMINER	
KANG, DONGHEE	

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 01/03/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/602,716	MOULI, CHANDRA	
	Examiner	Art Unit	
	Donghee Kang	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 November 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23,25-71 and 73-77* is/are pending in the application.

4a) Of the above claim(s) *14-23,25-29,42-48,63-71 and 73-77* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13,30-41 and 49-62* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *02 November 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims **1, 8-11, 24, 30-32, 39-41, 52, 59-62, & 72** are rejected under 35 U.S.C. 102(e) as being anticipated by Mann et al. (US 6,768,149).

Re claims 1, 30 & 52, Mann et al. teach an image sensor, comprising (Fig.3):

a substrate; an array of pixel cells formed at a surface of the substrate, wherein each pixel cell comprises a transistor formed adjacent to a photo-conversion device (310), transistor comprising a gate electrode (304) and a channel region under the gate electrode, the gate electrode having a length extending from a source/drain region to the photo-conversion device and comprising at least one gate region extending the length of the gate electrode and having a having a work-function greater than a work-function of $N^{+}Si$, the channel region comprising first and second channel portions under the first and second gate regions, respectively. See also Col.4, line 53-Cool.5, line 40.

Re claims 8, 39 & 59, Mann et al. teach at least one gate region comprises a layer of lower doped polysilicon of a first or second conductivity type.

Re claims 9, 40 & 60, Mann et al. teach at least one gate region has a dopant profile allowing for at least partially depletion of the at least one gate region.

Re claims 10 & 61, Mann et al. teach the dopant is indium.

Re claims 11, 41 & 62, Mann et al. teach there is approximately no active dopant in at least one portion of the channel region.

Re claims 31-32, Mann et al. teach the image sensor is a CMOS image sensor or a charge coupled device image sensor.

Re claims 24 & 72, Mann et al. Teach a pixel cell comprising:

A photo-conversion device; and a transistor formed adjacent to the photo-conversion device, wherein a gate of transistor is a mid-gap material. By the definition, mid-gap materials are those materials having a work-function falling between the work-functions of P+ silicon and N+ silicon (see specification paragraph 0038 on page 9). The lightly doped n and p-type silicon have a work-function between the work-functions of P+ silicon and N+ silicon.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims **2, 7, 12-13, 33, 38, 53, & 58** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mann et al. (US 6,768,149).

Re claims 2, 33 & 53, Mann et al. do not teach the transistor is a transfer transistor. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the transistor of Mann et al. as a transfer transistor since it is an intended use as matter of obvious design choice.

Re claims 7, 38 & 58, Mann et al. do not teach the gate region comprises P^+ doped polysilicon. It would have been obvious to one of ordinary skill in the art at the time the invention was made to select the concentration of the gate electrode, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233.

Re claims 12-13, Mann et al. do not explicitly teach a second transistor formed over the substrate. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form a plurality of transistors, such as reset, amplify and transfer transistors, in order to operate the image sensor properly.

5. Claims **3-6, 34-37, & 54-57** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mann et al. in view of Ponomarev (Gate-Work-function Engineering Using Poly-(Si,Ge) for High-Performance 0.18 μm CMOS Technology, IEDM 1997).

Mann et al. do not teach gate region comprises a mid-gap material including SiGe. Ponomarev et al. teach forming gate electrode using SiGe to control the gate work-function. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the polysilicon gate electrode with a mid-gap

material since threshold voltage can be controlled easily without threshold voltage adjustment implantations.

6. Claims **49-51** are rejected under 35 U.S.C. 103(a) as being unpatentable over Mann et al. in view of Boon (US 6,198,087).

Mann et al. do not teach a processor and an image sensor coupled to the processor. It is conventional in the art and also Boon teaches the image sensor coupled to the processor. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to couple the image sensor to the processor in order to operate the system properly.

Response to Arguments

7. Applicant's arguments filed 11-02-05 have been fully considered but they are not persuasive. Applicant argues that Mann does not disclose a gate region having a work-function greater than a workfunction of n+ Si because Mann is silent about the dopant concentration of the region 312. This is not convincing. The gate region 312 of Mann is doped with n having a less doping concentration than n+. It is a well known in the art that the concentration relationship between n-, n, n+ are n-< n < n+.

Conclusion

8. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Donghee Kang whose telephone number is 571-272-1656. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Donghee Kang
Primary Examiner
Art Unit 2811

dhk